Introduction

The probability that a resident of the United States will develop cancer at some point in his or her lifetime is 1 in 2 for men and 1 in 3 for women (ACS 2010). Nearly everyone's life has been directly or indirectly affected by cancer. Most scientists involved in cancer research believe that the environment in which we live and work may be a major contributor to the development of cancer (Lichtenstein *et al.* 2000). In this context, the "environment" is anything that people interact with, including exposures resulting from lifestyle choices, such as what we eat, drink, or smoke; natural and medical radiation, including exposure to sunlight; workplace exposures; drugs; socioeconomic factors that affect exposures and susceptibility; and substances in air, water, and soil (OTA 1981, IOM 2001). Other factors that play a major role in cancer development are infectious diseases, aging, and individual susceptibility, such as genetic predisposition (Montesano and Hall 2001). We rarely know what environmental factors and conditions are responsible for the onset and development of cancer; however, we have some understanding of how some types of cancer develop, especially cancer related to certain occupational exposures or the use of specific drugs. Many experts firmly believe that much of the cancer associated with the environment may be avoided (Tomatis *et al.* 1997).

The people of the United States, concerned about the relationship between their environment and cancer, have asked, through the U.S. Congress, for information about substances that are known or appear likely to cause cancer (i.e., to be carcinogenic). Section 301(b)(4) of the Public Health Service Act, as amended, provides that the Secretary of the Department of Health and Human Services shall publish a biennial report that contains the following information:

- A list of all substances (1) which either are known to be human carcinogens or may reasonably be anticipated to be human carcinogens and (2) to which a significant number of persons residing in the United States are exposed
- Information concerning the nature of such exposure and the estimated number of persons exposed to such substances.
- A statement identifying (1) each substance contained in this list for which no effluent, ambient, or exposure standard has been established by a Federal agency and (2) for each effluent, ambient, or exposure standard established by a Federal agency with respect to a substance contained in this list, the extent to which such standard decreases the risk to public health from exposure to the substance.
- A description of (1) each request received during the year to conduct research into, or testing for, the carcinogenicity of a substance and (2) how the Secretary and other responsible entities responded to each request.

The Report on Carcinogens (RoC) is an informational scientific and public health document that identifies and discusses agents, substances, mixtures, or exposure circumstances (hereinafter referred to as "substances") that may pose a hazard to human health by virtue of their carcinogenicity. For each listed substance, the RoC contains a substance profile which provides information on (1) the listing status, (2) cancer studies in humans and animals, (3) studies of genotoxicity (ability to damage genes) and biologic mechanisms, (4) the potential for human exposure to these substances, and (5) Federal regulations to limit exposures. The RoC does not present quantitative assessments of the risks of cancer associated with these substances. Thus, the listing of substances in the RoC only indicates a potential hazard and does not establish the exposure conditions that would pose cancer risks to individuals in their daily lives. Such formal risk assessments are the responsibility of the appropriate Federal, state, and local health regulatory and research agencies.

The substances listed in the RoC are either known or reasonably anticipated to cause cancer in humans in certain situations. With many listed substances, cancer may develop only after prolonged exposure. For example, smoking tobacco is known to cause cancer in humans, but not all people who smoke develop smoking-related cancer. With some substances or exposure circumstances, however, cancer may develop after even brief exposure. Examples include certain occupational exposures to asbestos or bis(chloromethyl) ether. The cancer hazard that listed substances pose to any one person depends on many factors. Among these are the intrinsic carcinogenicity of the substance, the amount and duration of exposure, and the individual's susceptibility to the carcinogenic action of the substance. Because of these considerations, the RoC does not attempt to rank substances according to the relative cancer hazards they pose.

Potential Beneficial Effects of Listed Carcinogens

As stated above, the purpose of the RoC is to identify hazards to human health posed by carcinogenic substances; therefore, it is not within the scope of this report to address potential benefits of exposure to certain carcinogenic substances in special situations. For example, numerous drugs typically used to treat cancer or other medical conditions have been shown to increase the frequency of primary cancer (i.e., cancer located in the organ or tissue where it originated) or secondary cancer (i.e., cancer that has spread from its organ or tissue of origin to other parts of the body) in patients undergoing treatment for specific diseases. In these cases, the benefits of using the drug to treat or prevent a specific disease outweigh the added cancer risk associated with its use. Personal decisions concerning voluntary exposure to carcinogenic substances should be based on information that is beyond the scope of the RoC. Individuals should not make decisions concerning the use of a given drug, or any other listed substance, based solely on the information contained in the RoC. Such decisions should be made only after consultation with a physician or other appropriate specialist.

Identification of Carcinogens

For many years, government research agencies (including the National Toxicology Program), industries, academia, and other research organizations have studied various substances to identify those that may cause cancer. Much of the information on specific chemicals or occupational exposures has been published in the scientific literature or in publicly available and peer-reviewed technical reports. This literature is a primary source of information for identifying and evaluating substances for listing in the RoC. Many of the listed substances also have been reviewed and evaluated by other organizations, including the World Health Organization's International Agency for Research on Cancer (IARC), in Lyon, France, the Environmental Protection Agency of the State of California, and other U.S. Federal and international agencies.

Studies in both humans and experimental animals are used to evaluate whether substances are potentially carcinogenic in humans. Other studies that may elucidate possible mechanisms of action of potential carcinogens also are considered in the evaluations. The strongest evidence for establishing a relationship between exposure to any given substance and cancer in humans comes from epidemiological studies — studies of the occurrence of a disease in a defined human population and the factors that affect its occurrence (Hill 1971). Interpretation of epidemiological studies of human exposure and cancer can be difficult (Rothman 1986), as they must rely on natural, not experimental, human exposure and must therefore consider

many factors that may affect cancer prevalence in addition to the exposure under study. One such factor is the latency period for cancer development (i.e., the time between first exposure to a carcinogen and development of cancer). The first sign of cancer often appears many years (sometimes 20 to 30 years or more) after exposure to the carcinogen. Epidemiological studies of workers exposed to high levels of chemicals have led to the identification of many carcinogens in the United States (Fontham *et al.* 2009).

Another valuable method for identifying substances as potential human carcinogens is the long-term bioassay in experimental animals. These studies provide accurate information about dose and duration of exposure, and they are less affected than epidemiological studies by possible interactions of the test substance with other chemicals or modifying factors (Huff 1999). In these studies, the substance is given to one or (usually) two species of laboratory rodents over a range of doses for nearly the animals' entire lives. Experimental cancer research is based on the scientific assumption that substances causing cancer in animals will have similar effects in humans; however, it is not possible to predict with complete certainty from animal studies alone which substances will be carcinogenic in humans. Known human carcinogens have also been shown to cause cancer in experimental animals when tested adequately (Fung *et al.* 1995). In many cases, a substance first was found to cause cancer in animals and later confirmed to cause cancer in humans (Huff 1993, 1999). How experimental animals respond to substances, including developing cancer or other illnesses, does not always strictly correspond to how people will respond. Nevertheless, experimental animal studies remain the best tool for detecting potential human health hazards of all kinds, including cancer (OTA 1981, Tomatis *et al.* 1997).

In addition to the use of studies in humans and experimental animals, alternative testing methods that incorporate advances in molecular toxicology, computational sciences, and information technology are being developed to prioritize substances for carcinogenicity testing and reduce the use of animals in testing. A 2007 report by the National Academy of Science's National Research Council, *Toxicity Testing in the 21st Century,* outlined strategies for new approaches, and a research collaboration among the National Toxicology Program (NTP), the U.S. Environmental Protection Agency (EPA), and the National Institutes of Health Chemical Genomics Center was established to evaluate whether high-throughput and computational toxicology approaches can yield data that predict the results of toxicity studies in experimental animals. The results should facilitate prioritization of chemicals for further testing, as well as enable more effective predictions of carcinogenic risk of substances to humans (Collins *et al.* 2008).

Listing Criteria

The criteria for listing an agent, substance, mixture, or exposure circumstance in the RoC are shown in the box on this page. The listing criteria presented here were first adopted for use in the *Eighth Report on Carcinogens*, which was published in 1998. The listing criteria were clarified the following year in two *Federal Register* notices (NTP 1999a,b). Listing criteria for substances listed in earlier editions of the RoC are outlined in the introductions to those editions.

Preparation of the RoC

The Secretary of the Department of Health and Human Services has delegated the responsibility for the preparation of the RoC to the NTP. The process used to prepare the RoC involves several levels of scientific review and opportunities for public comment on the substances considered for listing in or delisting (removal) from the RoC. For the *Twelfth Report on Carcinogens*, the NTP revised the RoC review process to enhance the scientific development of the report and address guidance in the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (OMB 2004). Two important new elements in the RoC review process are (1) public peer review of draft background documents by *ad hoc* scientific expert panels and (2) public peer review of draft substance profiles by the NTP Board of Scientific Counselors. (See NTP Report on Carcinogens Review Process, below, for details of the process.)

Known To Be Human Carcinogen:

There is sufficient evidence of carcinogenicity from studies in humans,* which indicates a causal relationship between exposure to the agent, substance, or mixture, and human cancer.

Reasonably Anticipated To Be Human Carcinogen:

There is limited evidence of carcinogenicity from studies in humans,* which indicates that causal interpretation is credible, but that alternative explanations, such as chance, bias, or confounding factors, could not adequately be excluded,

or

there is sufficient evidence of carcinogenicity from studies in experimental animals, which indicates there is an increased incidence of malignant and/or a combination of malignant and benign tumors (1) in multiple species or at multiple tissue sites, or (2) by multiple routes of exposure, or (3) to an unusual degree with regard to incidence, site, or type of tumor, or age at onset,

or

there is less than sufficient evidence of carcinogenicity in humans or laboratory animals; however, the agent, substance, or mixture belongs to a well-defined, structurally related class of substances whose members are listed in a previous Report on Carcinogens as either known to be a human carcinogen or reasonably anticipated to be a human carcinogen, or there is convincing relevant information that the agent acts through mechanisms indicating it would likely cause cancer in humans.

Conclusions regarding carcinogenicity in humans or experimental animals are based on scientific judgment, with consideration given to all relevant information. Relevant information includes, but is not limited to, dose response, route of exposure, chemical structure, metabolism, pharmacokinetics, sensitive sub-populations, genetic effects, or other data relating to mechanism of action or factors that may be unique to a given substance. For example, there may be substances for which there is evidence of carcinogenicity in laboratory animals, but there are compelling data indicating that the agent acts through mechanisms which do not operate in humans and would therefore not reasonably be anticipated to cause cancer in humans.

*This evidence can include traditional cancer epidemiology studies, data from clinical studies, and/or data derived from the study of tissues or cells from humans exposed to the substance in question, which can be useful for evaluating whether a relevant cancer mechanism is operating in humans.

Estimation of Exposure

The RoC is required to list only substances to which a significant number of people living in the United States are exposed. Some substances that have been banned or restricted in use (e.g., safrole, arsenical pesticides, and mirex) are listed either because people who

were previously exposed remain potentially at risk or because these substances still are present in the environment.

The RoC is also required to provide information about the nature of exposures and the estimated numbers of people exposed to listed substances. Four of the agencies participating with the NTP in preparation of the *Twelfth Report on Carcinogens* — the Consumer Product Safety Commission (CPSC), EPA, U.S. Food and Drug Administration (FDA), and Occupational Safety and Health Administration (OSHA) — are responsible for regulating hazardous substances and limiting the exposure to and use of such substances. Because little information typically is available, estimating the number of people who could be exposed and the route, intensity, and duration of exposure for each substance is a difficult task. However, other types of information, such as data on use, production, and occupational or environmental exposure, can be used to determine whether there is (or was) exposure in the United States, and this information is included in each substance profile. The National Institute for Occupational Safety and Health (NIOSH) has conducted two occupational exposure surveys: the National Occupational Hazard Survey (NOHS), conducted from 1972 to 1974, and the National Occupational Exposure Survey (NOES), conducted from 1981 to 1983. These surveys yielded data on potential exposure to many listed substances. Although dated, NOES estimates are provided in the profiles of the listings when available, and NOHS figures are provided if no other exposure data are available.

Regulations and Guidelines

The RoC is required to identify each of the listed substances for which no standard for exposure or release into the environment has been established by a Federal agency. The RoC addresses this requirement by providing in each profile a summary of the regulations and guidelines, if any, that are likely to decrease human exposure to that substance. Some of these regulations and guidelines have been enacted for reasons other than the substance's carcinogenicity (e.g., to prevent adverse health effects other than cancer or to prevent accidental poisoning of children). These regulations are included in the profiles because reduction of exposure to a suspected or known carcinogen is likely to reduce the risk for cancer. Regulations are organized by regulatory agencies and the acts enforced by those agencies, and are provided at the end of each profile.

The majority of the regulations cited in the RoC were enacted by the following Federal agencies: CPSC, the U.S. Department of Transportation, EPA, FDA, and OSHA. The guidelines cited in the RoC primarily are those published by NIOSH and the American Conference of Governmental Industrial Hygienists. In addition, regulations and guidelines enacted by other governmental agencies are cited if their likely outcome is to reduce exposure to the substance. It is beyond the scope of this report to provide detailed information or interpretation concerning the implementation of each regulatory act, and no attempt is made to do so. Some commonly used regulatory terms are defined in the Glossary, which follows the Substance Profiles. Links to the Web sites for the *Code of Federal Regulations* and for each of the major regulatory agencies are provided at the end of the Reference section of this Introduction for those wishing to obtain additional information on these agencies and their regulations.

Two regulations that apply to all substances listed in the RoC and whose purpose is to reduce exposure to the listed substances were identified; however, because they apply to every substance listed in the RoC, they are not identified individually in the listing profiles but are described below:

- OSHA's Hazard Communication Standard. This regulation is intended to communicate the hazards of chemicals and appropriate protective measures to protect employees. The program includes maintenance of a list of hazardous chemicals, labeling of containers in the workplace, and preparation and distribution of material safety data sheets to employees. The rule states that a chemical shall be considered "hazardous" if it has been listed as a carcinogen or potential carcinogen in current editions of (1) the NTP's RoC, (2) the IARC Monographs, or (3) OSHA's Occupational Safety and Health Standards, Subpart Z — Toxic and Hazardous Substances.
- EPA's Criteria for the Evaluation of Permit Applications for Ocean Dumping of Materials under the Toxic Substances Control Act. This regulation prohibits ocean dumping of materials containing "known carcinogens, mutagens, or teratogens or materials suspected to be carcinogens, mutagens, or teratogens by responsible scientific opinion" as other than trace contaminants.

Two OSHA regulations identified in some of the listing profiles require clarification:

- Specific substances are listed as having "comprehensive standards" if, in addition to the permissible exposure limit (PEL), OSHA has regulations for the substance that include provisions for exposure monitoring, engineering and work practice controls, use of respirators and protective garments and equipment, hygiene facilities, information and training, labeling of substance containers and worker areas in which the substance is used, and health screening programs. The sets of comprehensive standards are provided in 29 CFR 1910 Subpart Z and also on the OSHA Web site.
- The OSHA PEL identified in the profiles for Certain Glass Wool Fibers (Inhalable), Ceramic Fibers (Respirable Size), and Wood Dust are based on the standard for Particulates Not Otherwise Regulated (PNOR). This standard sets limits applicable to all inert or nuisance dusts, whether mineral, inorganic, or organic, not identified specifically by substance name. OSHA recommended that the profiles for these three substances include the PEL established by the PNOR standard.

Cancer Rates and Estimates of Risk Reduction

Cancer is the second leading cause of death in the United States. According to estimates from the American Cancer Society, there were over 1.5 million new cancer cases and over 560,000 deaths from cancer in the United States in 2009 (Gapstur and Thun 2010). In men, the most common sites of newly diagnosed cancer are the prostate, lung and bronchus, and colorectum (colon and rectum); these three sites account for 52% of all cancer cases, and prostate cancer is the most common (28%). In women, the three most common sites, accounting for 52% of the total, are the breast (28%), lung and bronchus, and colorectum. At present, cancer at these sites also results in the highest death rates: in men, mortality is highest for cancer of the lung and bronchus, followed by the prostate and colorectum; in women, mortality is highest for cancer of lung and bronchus, followed by the breast and colorectum (Jemal *et al.* 2010). Data on cancer incidence and death rates were reported in the "Annual Report to the Nation on the Status of Cancer, 1975–2006" (Edwards *et al.* 2010) and "Cancer Statistics, 2010," prepared annually by the American Cancer Society (Jemal *et al.* 2010); both reports use the most recent data from the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute (SEER 2010).

In recent years, there have been modest decreases in overall cancer incidence rates (0.5% per year in women from 1998 to 2006 and 1.3% per year in men from 2000 to 2006) and death rates (1.5% per

year from 2002 to 2006 in women and 2% per year from 2001 to 2006 in men) (Edwards *et al*. 2010, Jemal *et al*. 2010). These decreases are largely explained by decreased rates of colorectal, prostate, and lung cancer in men and breast and colorectal cancer in women. Mortality from lung cancer in women has stabilized since 2003, after increasing for many years (Jemal *et al.* 2010). In contrast, mortality from other types of cancers has been increasing. The largest increases in death rates have been for liver cancer in men and women, esophageal cancer and melanoma in men, and lung and pancreatic cancer in women (Jemal *et al.* 2010). Incidence rates have increased for (1) kidney cancer, melanoma of the skin, and leukemia in men and women, (2) myeloma and cancer of the esophagus and liver in men, and (3) cancer of the lung, thyroid, pancreas, and urinary bladder, and non-Hodgkin's lymphoma in women (Edwards *et al.* 2010). Of particular concern is that incidence rates of cancer in children have been increasing; rates are highest among infants and then decline until around age 9, after which the rates increase with age. For 2010, the American Cancer Society estimated that there would be 10,700 new cancer cases in children under the age of 14 (all races combined). Leukemia (31%) and brain cancer (21%) account for over half of diagnosed cases of childhood cancer (Jemal *et al*. 2010). Children are particularly vulnerable to environmental risk factors, including numerous toxins and detrimental exposures from air, food, water, medicines, pesticides, and ionizing radiation, even before birth (NCI 2010).

The World Health Organization predicts that by 2030, 12 million deaths worldwide will be due to cancer; however, 30% to 40% of these deaths are considered to be preventable (WHO 2009). Approaches to reduction of cancer incidence and mortality include both primary prevention, including the reduction or elimination of exposure, and secondary prevention, including early detection via screening and treatment of any diagnosed precancerous conditions or early malignancies (Bode and Dong 2009). Reduction of tobacco use over the past 50 years is largely responsible for the decrease in lung-cancer mortality in men. About 40% of the decrease in overall cancer mortality in men is due to decreased lung-cancer mortality, indicating that primary prevention has a major impact in improving public health (Jemal *et al*. 2010). For example, a combination of education and social policies, such as excise taxes and smoke-free air laws, contribute to reducing tobacco use. Mortality from lung cancer has not yet decreased in women because cigarette smoking in women peaked 20 years later than in men. Decreases in mortality from cervical, breast, and colon cancer are thought to have resulted from a combination of early detection and improvements in treatment, although reduction in the use of menopausal hormone therapy among post-menopausal women starting in 2001 may also have contributed to decreases in breast-cancer incidence.

Primary prevention is the basis of current regulatory policies that aim to lower human exposure to cancer-causing substances and thereby improve public health. It is reasonable and prudent to accept that reducing exposure for any reason, particularly to substances shown to be carcinogenic in experimental animals, will decrease the incidence of cancer in humans (Tomatis *et al.* 1997, Montesano and Hall 2001). For each effluent, ambient, or exposure standard established by a Federal agency for a listed substance, the RoC is required to state the extent to which, on the basis of available medical, scientific, or other data, the implementation of that standard decreases the public's risk for cancer. This statement requires quantitative information on how much protection from cancer the public is afforded by established Federal standards. Estimating the extent to which listing a substance in the RoC protects public health is perhaps the most difficult task in preparing the RoC. The carcinogenic risk depends on many things, including the intensity, route, and duration of exposure to a carcinogen. People may respond differently to similar exposures, depending on their age, sex, nutritional status, overall health, genetics, and many other factors. Only in a few instances can risk for cancer be estimated with complete confidence, and these estimations require studies of long-term human exposures and cancer incidence in restricted environments, which rarely are available. However, there is evidence that regulations have led to the reduction in exposure to a number of substances listed in the RoC and probably have contributed, in part, to the decreases in cancer incidence and mortality observed over the past decade. The reduction in cancer death rates translates to the prevention of approximately 767,000 deaths over the 16-year period from 1990 to 2006 (Jemal *et al.* 2010). For example, major environmental pollution prevention acts, such as EPA's Resource Conservation and Recovery Act, Clean Water Act, and Clean Air Act, were passed in the early 1970s. These laws have led to reduced exposure to a number of pollutants. Although no analyses were found to determine whether these regulations have decreased cancer incidences, analyses have shown that they have reduced premature deaths from respiratory illnesses and heart attacks (EPA 2010). Studies have shown associations between lung-cancer mortality and air pollution; therefore, it seems reasonable that regulations reducing air pollution have also reduced cancer risks (Montesano and Hall 2001, Raaschou-Nielsen *et al.* 2010). U.S. workplace levels of many occupational carcinogens also have been reduced since the 1970s (Fontham *et al.* 2009), and it therefore is presumed that these reductions have prevented occupationally related cancers.

Listing of Substances in the *Twelfth Report on Carcinogens*

Each edition of the RoC is cumulative and includes substances newly reviewed in addition to those listed in previous editions. The *Twelfth Report on Carcinogens* contains 240 substance profiles, some of which (e.g., Estrogens, Steroidal) consist of a class of structurally related chemicals or agents. These include 54 profiles for substances listed as *known to be human carcinogens* and 186 profiles for substances listed as *reasonably anticipated to be human carcinogens*. Profiles for related exposures, such as exposure to various types of ultraviolet radiation, and selected members of chemical families, such as nitroarenes, are often grouped together. There are six new listings and two revised listings. Of the six newly listed substances, Aristolochic Acids are listed as known to be human carcinogens, and Captafol, Cobalt–Tungsten Carbide: Powders and Hard Metals, *o*-Nitrotoluene, Riddelliine, and Styrene are listed as reasonably anticipated to be human carcinogens. Formaldehyde, which was first listed in the *Second Annual Report on Carcinogens* in 1981 as reasonably anticipated to be a human carcinogen, is now listed as known to be a human carcinogen. Certain Glass Wool Fibers (Inhalable) was first listed as Glass Wool (Respirable Size) in the *Seventh Annual Report on Carcinogens* (1994) as reasonably anticipated to be a human carcinogen; although the classification remains the same, the review of Glass Wool Fibers has resulted in a change in the scope of the listing.

Immediately following a description of the NTP Report on Carcinogens Review Process (below), the names of all the substances — agents, substances, mixtures, or exposure circumstances — listed in the RoC are given in alphabetical order for the two listing categories. Part A identifies the substances listed in the RoC as *known to be human carcinogens*, and Part B identifies those listed as *reasonably anticipated to be human carcinogens.* The substance profiles are arranged in alphabetical order and contain (1) a brief description of each substance, with a summary of the evidence for its carcinogenicity, (2) relevant information on properties, use, production, and exposure, and (3) a summary of the regulations and guidelines that are likely to decrease

exposure to the substance. The profiles include references to scientific literature used to support the listings. The substances listed in the RoC do not include all human carcinogens. The RoC lists only those nominated agents, substances, mixtures, or exposure circumstances for which relevant data exist and have been reviewed and found to meet the listing criteria defined above. As additional substances are nominated, they will be considered and reviewed for possible listing in future editions of the RoC.

Other Information Provided in the *Twelfth Report on Carcinogens*

Following the Substance Profiles, additional information is provided about terms that are used frequently in the profiles, including a Glossary, a list of Acronyms and Abbreviations, and Units of Measurement. In addition, the following appendices are provided:

- Appendix A provides a list of manufacturing processes, occupations, and exposure circumstances classified by IARC as carcinogenic to humans.
- Appendix B lists the agents, substances, mixtures, or exposure circumstances that have been delisted from the RoC.
- Appendix C lists the agents, substances, mixtures, or exposure circumstances that have been reviewed but not recommended for listing in the RoC.
- Appendix D identifies participants who collaborated in preparation of the *Twelfth Report on Carcinogens*.
- Appendix E is a table of chemicals that have been nominated to the NTP for toxicological or carcinogenicity testing since 2004.
- Appendix F is a cross-referenced list of substances and their common synonyms or abbreviations.
- Appendix G lists, by Chemical Abstract Service (CAS) Registry number, all of the chemicals included in the RoC for which CAS Registry numbers were identified.

The *Twelfth Report on Carcinogens* was prepared following procedures that maximized the quality, objectivity, utility, and integrity of the information contained in the report. Although not anticipated, factual errors or omissions in this report may be identified after its distribution. If this should happen, these errors or omissions will be addressed by the NTP. Where appropriate, corrections will initially be posted on the NTP RoC Center Web site at http://ntp.niehs.nih.gov/go/roc and then made in the next edition of the RoC. For more information on the published *Twelfth Report on Carcinogens*, including how to request a printed or electronic copy or to access it on the Internet, visit the NTP RoC Center Web site at the link provided above or contact Dr. Ruth Lunn, Director, Report on Carcinogens Center, National Toxicology Program, MD K2-14, P.O. Box 12233, Research Triangle Park, NC 27709; telephone (919) 316-4637; fax (919) 541-0144; e-mail lunn@niehs.nih.gov.

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Web Sites

American Conference of Governmental Industrial Hygienists (ACGIH)
http://www.acgih.org/home.htm

Code of Federal Regulations (CFR), U.S. Government Printing Office
http://www.gpoaccess.gov/cfr/index.html

Consumer Product Safety Commission (CPSC)
http://www.cpsc.gov

Department of Transportation (DOT)
http://www.dot.gov

Environmental Protection Agency (EPA)
http://www.epa.gov
Integrated Risk Information System: http://cfpub.epa.gov/ncea/iris/index.cfm

Food and Drug Administration (FDA)
http://www.fda.gov
Center for Food Safety & Applied Nutrition: http://www.cfsan.fda.gov

International Agency for Research on Cancer (IARC).
http://www.iarc.fr
Monographs on the Evaluation of Carcinogenic Risks of Chemicals to Humans
http://monographs.iarc.fr/index.php

National Institute for Occupational Safety and Health (NIOSH)
http://www.cdc.gov/niosh
Pocket Guide to Chemical Hazards: http://www.cdc.gov/niosh/npg
NIOSH Safety and Health Topic – Cancer: http://www.cdc.gov/niosh/topics/cancer
NIOSH Carcinogen List: http://www.cdc.gov/niosh/topics/cancer/npotocca.html

National Toxicology Program (NTP)
http://ntp.niehs.nih.gov
Report on Carcinogens: http://ntp.niehs.nih.gov/go/roc

Occupational Safety and Health Administration (OSHA)
http://www.osha.gov